

AVIATION

The Oldest American Aeronautical Magazine

MAY 4, 1925

Issued Weekly

PRICE 10 CENTS



Aircraft Maneuvers in the Pacific

VOLUME
XVIII

SPECIAL FEATURES

NUMBER
18

THE ELIAS MAILPLANE
THE ECONOMY OF AIR COOLING
STABILITY AND CONTROLLABILITY OF AIRPLANES

GARDNER PUBLISHING CO., Inc.
HIGHLAND, N. Y.
225 FOURTH AVENUE, NEW YORK

Entered as Second-Class Matter, Nov. 22, 1920, at the Post Office at Highland, N. Y.
under Act of March 3, 1879.

It Meets Every Emergency



U. S. Air Mail Plane at Emergency Landing Field

BY THEIR cool courage, determination and indomitable spirit, Uncle Sam's flying postmen have made the U. S. Air Mail Service synonymous with speed plus dependability.

With almost clock-like regularity they sweep over mountain tops, across plains and high above populous cities, cutting the mail time between New York and San Francisco from 100 hours to a scant third of that time. It is an achievement of which both the Postoffice Department and the flyers themselves may feel justifiably proud.

To make such a service possible, it was necessary that the continent be gridded with flying fields, so that flyers might land, replenish fuel and oil or change planes. It was also necessary that emer-

gency landing fields be designated, so that the planes might be brought to earth in safety at the will of the pilot.

As these aerial postmen fly that part of their course between Indiana on the East and Wyoming on the West they know that at every landing field—government, commercial and emergency—they will find a supply of Standard aviation products to carry them surely and safely on their way.

The Standard Oil Company (Indiana) long ago recognized its obligation to aviation. This sense of responsibility led to the development of its dependable aviation gasoline and oil and to making these products available to every flyer at practically every point in the middle west.

STANDARD OIL COMPANY

General Offices: 910 S. Michigan Ave., Chicago, Illinois

ILLINOIS
Chicago
Decatur
Joliet
Peoria
Spring

INDIANA
Evansville
Indianapolis
Jacksboro
KANSAS
Wichita

IOWA
Des Moines
Des Moines
Des Moines
Des Moines

KENTUCKY
Frankfort
Lexington
Louisville
Paducah

MISSOURI
St. Louis
St. Louis
St. Louis
St. Louis

NEBRASKA
Omaha
Lincoln
Nebraska
Nebraska

MINNESOTA
St. Paul
St. Paul
St. Paul
St. Paul

MAY 4, 1925

AVIATION

VOL. XVIII NO. 18

Published every Monday

CONTENTS

27 Inside	405	New Details of the Learning Amphibian	402
31: Elton McPherson	404	Book Review	405
32: The Value of Speed	407	The Ford Group	406
33: The Economy of Air Cooling	408	The Economy of Air Cooling	402
34: Airports and Airways	409	Airports and Airways	404
35: United States Air Force	410	United States Air Force	406

GARDNER PUBLISHING COMPANY, Inc., Publishers

GENERAL AND EDITORIAL ROOMS: 325 FOURTH AVENUE, NEW YORK

CARE ADDRESS: AIRMAIL

Publication Office

HIGHLAND, N. Y.

Subscription price: Four dollars per year. Canada, five dollars. Foreign, six dollars. Single copies ten cents. Each number 22 cents. Copyright 1925, by the Gardner Publishing Company.

Entered as second-class matter May 22, 1925, at the Post Office at Highland, N. Y., under act of March 3, 1879.

THREE IMPORTANT ITEMS



No. 2617-Navy SPERRY
7" High, 3" Wide, 4 1/4" Base.
Wt. 1 1/2 lbs. New and
reconditioned price \$10.00
Shoulder or Scotch alternative 0
to 1950 ft. 3 1/2" diameter dual
N. or and beautifully finished in
dull black. Price \$10.00 ea.



No. 911 NEW STOCK N.A.K.
Clear or amber - \$4.10 per pair
Half green half clear - \$4.85 per pair
A few other important items are carry in stock
Belts and flying clothing, 3-6" three ply
bullet-resistant 40" x 48", steel tubing all sizes,
sheet steel and tank metal, fabric and rubber
up covers, Tinsmith drops and various, Good-
year aircraft box, Grommets, Spark plug
screws, nuts, tubes, etc.



No. 510
New aluminum strainer
2" wide, 7" overall, 3-8"
inlet and outlet, wt.
1 1/2 lbs., price \$5.95
All metal gas lines with
all connections ready to
put on J.N. 4-De. Price
\$1.00 ea.

Write for our Sales Bulletins

JOHNSON AIRPLANE AND SUPPLY CO.

DAYTON — OHIO

When Writing to Advertisers, Please Mention AVIATION



WRIGHT J-4 AIR-COOLED AERONAUTICAL ENGINE

THE only reason that air-cooled aeronautical engines have not heretofore been generally used in flying craft is because water-cooled engines were more highly developed.

The Wright Aeronautical Corporation has spent the past two years in intensive laboratory and engineering tests perfecting the present Wright "Whirlwind" series which is typified in the present Wright J-4 model.

Many governmental as well as commercial aeronautical engineers throughout the world have followed intently each step in the development of air-cooled motors, and they now realize that all the many advantages of an air-cooled aeronautical power plant may be obtained in the Wright J-4, 200 H. P.

Bulletin No. 8 fully describing the Wright J-4 engine, together with specifications etc. will be mailed upon request.

WRIGHT AERONAUTICAL CORPORATION
Paterson, New Jersey, U. S. A.

Runs single in power plant and plane.
Gives higher performance.
Fewer vibration troubles.
Best for flying in atmosphere hot or cold weather.
Decreased weight and handling expense.



Increased flying time.
Decreased fuel and weight of spare parts.
Runs quietly in cold weather.
Low vulnerability to attack.
Decreased fire risk.

WRIGHT J-4'S ARE JUST AS DEPENDABLE AS THE FAMOUS WRIGHT E-4

WRIGHT

When Flying to Adventure, Please Mention AVIATION

L. D. GASTON, President
Geo. D. CHASE, Vice President
L. D. WRIGHT, Treasurer
Gaston, Chase and Wright, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391, 393, 395, 397, 399, 401, 403, 405, 407, 409, 411, 413, 415, 417, 419, 421, 423, 425, 427, 429, 431, 433, 435, 437, 439, 441, 443, 445, 447, 449, 451, 453, 455, 457, 459, 461, 463, 465, 467, 469, 471, 473, 475, 477, 479, 481, 483, 485, 487, 489, 491, 493, 495, 497, 499, 501, 503, 505, 507, 509, 511, 513, 515, 517, 519, 521, 523, 525, 527, 529, 531, 533, 535, 537, 539, 541, 543, 545, 547, 549, 551, 553, 555, 557, 559, 561, 563, 565, 567, 569, 571, 573, 575, 577, 579, 581, 583, 585, 587, 589, 591, 593, 595, 597, 599, 601, 603, 605, 607, 609, 611, 613, 615, 617, 619, 621, 623, 625, 627, 629, 631, 633, 635, 637, 639, 641, 643, 645, 647, 649, 651, 653, 655, 657, 659, 661, 663, 665, 667, 669, 671, 673, 675, 677, 679, 681, 683, 685, 687, 689, 691, 693, 695, 697, 699, 701, 703, 705, 707, 709, 711, 713, 715, 717, 719, 721, 723, 725, 727, 729, 731, 733, 735, 737, 739, 741, 743, 745, 747, 749, 751, 753, 755, 757, 759, 761, 763, 765, 767, 769, 771, 773, 775, 777, 779, 781, 783, 785, 787, 789, 791, 793, 795, 797, 799, 801, 803, 805, 807, 809, 811, 813, 815, 817, 819, 821, 823, 825, 827, 829, 831, 833, 835, 837, 839, 841, 843, 845, 847, 849, 851, 853, 855, 857, 859, 861, 863, 865, 867, 869, 871, 873, 875, 877, 879, 881, 883, 885, 887, 889, 891, 893, 895, 897, 899, 901, 903, 905, 907, 909, 911, 913, 915, 917, 919, 921, 923, 925, 927, 929, 931, 933, 935, 937, 939, 941, 943, 945, 947, 949, 951, 953, 955, 957, 959, 961, 963, 965, 967, 969, 971, 973, 975, 977, 979, 981, 983, 985, 987, 989, 991, 993, 995, 997, 999, 1001, 1003, 1005, 1007, 1009, 1011, 1013, 1015, 1017, 1019, 1021, 1023, 1025, 1027, 1029, 1031, 1033, 1035, 1037, 1039, 1041, 1043, 1045, 1047, 1049, 1051, 1053, 1055, 1057, 1059, 1061, 1063, 1065, 1067, 1069, 1071, 1073, 1075, 1077, 1079, 1081, 1083, 1085, 1087, 1089, 1091, 1093, 1095, 1097, 1099, 1101, 1103, 1105, 1107, 1109, 1111, 1113, 1115, 1117, 1119, 1121, 1123, 1125, 1127, 1129, 1131, 1133, 1135, 1137, 1139, 1141, 1143, 1145, 1147, 1149, 1151, 1153, 1155, 1157, 1159, 1161, 1163, 1165, 1167, 1169, 1171, 1173, 1175, 1177, 1179, 1181, 1183, 1185, 1187, 1189, 1191, 1193, 1195, 1197, 1199, 1201, 1203, 1205, 1207, 1209, 1211, 1213, 1215, 1217, 1219, 1221, 1223, 1225, 1227, 1229, 1231, 1233, 1235, 1237, 1239, 1241, 1243, 1245, 1247, 1249, 1251, 1253, 1255, 1257, 1259, 1261, 1263, 1265, 1267, 1269, 1271, 1273, 1275, 1277, 1279, 1281, 1283, 1285, 1287, 1289, 1291, 1293, 1295, 1297, 1299, 1301, 1303, 1305, 1307, 1309, 1311, 1313, 1315, 1317, 1319, 1321, 1323, 1325, 1327, 1329, 1331, 1333, 1335, 1337, 1339, 1341, 1343, 1345, 1347, 1349, 1351, 1353, 1355, 1357, 1359, 1361, 1363, 1365, 1367, 1369, 1371, 1373, 1375, 1377, 1379, 1381, 1383, 1385, 1387, 1389, 1391, 1393, 1395, 1397, 1399, 1401, 1403, 1405, 1407, 1409, 1411, 1413, 1415, 1417, 1419, 1421, 1423, 1425, 1427, 1429, 1431, 1433, 1435, 1437, 1439, 1441, 1443, 1445, 1447, 1449, 1451, 1453, 1455, 1457, 1459, 1461, 1463, 1465, 1467, 1469, 1471, 1473, 1475, 1477, 1479, 1481, 1483, 1485, 1487, 1489, 1491, 1493, 1495, 1497, 1499, 1501, 1503, 1505, 1507, 1509, 1511, 1513, 1515, 1517, 1519, 1521, 1523, 1525, 1527, 1529, 1531, 1533, 1535, 1537, 1539, 1541, 1543, 1545, 1547, 1549, 1551, 1553, 1555, 1557, 1559, 1561, 1563, 1565, 1567, 1569, 1571, 1573, 1575, 1577, 1579, 1581, 1583, 1585, 1587, 1589, 1591, 1593, 1595, 1597, 1599, 1601, 1603, 1605, 1607, 1609, 1611, 1613, 1615, 1617, 1619, 1621, 1623, 1625, 1627, 1629, 1631, 1633, 1635, 1637, 1639, 1641, 1643, 1645, 1647, 1649, 1651, 1653, 1655, 1657, 1659, 1661, 1663, 1665, 1667, 1669, 1671, 1673, 1675, 1677, 1679, 1681, 1683, 1685, 1687, 1689, 1691, 1693, 1695, 1697, 1699, 1701, 1703, 1705, 1707, 1709, 1711, 1713, 1715, 1717, 1719, 1721, 1723, 1725, 1727, 1729, 1731, 1733, 1735, 1737, 1739, 1741, 1743, 1745, 1747, 1749, 1751, 1753, 1755, 1757, 1759, 1761, 1763, 1765, 1767, 1769, 1771, 1773, 1775, 1777, 1779, 1781, 1783, 1785, 1787, 1789, 1791, 1793, 1795, 1797, 1799, 1801, 1803, 1805, 1807, 1809, 1811, 1813, 1815, 1817, 1819, 1821, 1823, 1825, 1827, 1829, 1831, 1833, 1835, 1837, 1839, 1841, 1843, 1845, 1847, 1849, 1851, 1853, 1855, 1857, 1859, 1861, 1863, 1865, 1867, 1869, 1871, 1873, 1875, 1877, 1879, 1881, 1883, 1885, 1887, 1889, 1891, 1893, 1895, 1897, 1899, 1901, 1903, 1905, 1907, 1909, 1911, 1913, 1915, 1917, 1919, 1921, 1923, 1925, 1927, 1929, 1931, 1933, 1935, 1937, 1939, 1941, 1943, 1945, 1947, 1949, 1951, 1953, 1955, 1957, 1959, 1961, 1963, 1965, 1967, 1969, 1971, 1973, 1975, 1977, 1979, 1981, 1983, 1985, 1987, 1989, 1991, 1993, 1995, 1997, 1999, 2001, 2003, 2005, 2007, 2009, 2011, 2013, 2015, 2017, 2019, 2021, 2023, 2025, 2027, 2029, 2031, 2033, 2035, 2037, 2039, 2041, 2043, 2045, 2047, 2049, 2051, 2053, 2055, 2057, 2059, 2061, 2063, 2065, 2067, 2069, 2071, 2073, 2075, 2077, 2079, 2081, 2083, 2085, 2087, 2089, 2091, 2093, 2095, 2097, 2099, 2101, 2103, 2105, 2107, 2109, 2111, 2113, 2115, 2117, 2119, 2121, 2123, 2125, 2127, 2129, 2131, 2133, 2135, 2137, 2139, 2141, 2143, 2145, 2147, 2149, 2151, 2153, 2155, 2157, 2159, 2161, 2163, 2165, 2167, 2169, 2171, 2173, 2175, 2177, 2179, 2181, 2183, 2185, 2187, 2189, 2191, 2193, 2195, 2197, 2199, 2201, 2203, 2205, 2207, 2209, 2211, 2213, 2215, 2217, 2219, 2221, 2223, 2225, 2227, 2229, 2231, 2233, 2235, 2237, 2239, 2241, 2243, 2245, 2247, 2249, 2251, 2253, 2255, 2257, 2259, 2261, 2263, 2265, 2267, 2269, 2271, 2273, 2275, 2277, 2279, 2281, 2283, 2285, 2287, 2289, 2291, 2293, 2295, 2297, 2299, 2301, 2303, 2305, 2307, 2309, 2311, 2313, 2315, 2317, 2319, 2321, 2323, 2325, 2327, 2329, 2331, 2333, 2335, 2337, 2339, 2341, 2343, 2345, 2347, 2349, 2351, 2353, 2355, 2357, 2359, 2361, 2363, 2365, 2367, 2369, 2371, 2373, 2375, 2377, 2379, 2381, 2383, 2385, 2387, 2389, 2391, 2393, 2395, 2397, 2399, 2401, 2403, 2405, 2407, 2409, 2411, 2413, 2415, 2417, 2419, 2421, 2423, 2425, 2427, 2429, 2431, 2433, 2435, 2437, 2439, 2441, 2443, 2445, 2447, 2449, 2451, 2453, 2455, 2457, 2459, 2461, 2463, 2465, 2467, 2469, 2471, 2473, 2475, 2477, 2479, 2481, 2483, 2485, 2487, 2489, 2491, 2493, 2495, 2497, 2499, 2501, 2503, 2505, 2507, 2509, 2511, 2513, 2515, 2517, 2519, 2521, 2523, 2525, 2527, 2529, 2531, 2533, 2535, 2537, 2539, 2541, 2543, 2545, 2547, 2549, 2551, 2553, 2555, 2557, 2559, 2561, 2563, 2565, 2567, 2569, 2571, 2573, 2575, 2577, 2579, 2581, 2583, 2585, 2587, 2589, 2591, 2593, 2595, 2597, 2599, 2601, 2603, 2605, 2607, 2609, 2611, 2613, 2615, 2617, 2619, 2621, 2623, 2625, 2627, 2629, 2631, 2633, 2635, 2637, 2639, 2641, 2643, 2645, 2647, 2649, 2651, 2653, 2655, 2657, 2659, 2661, 2663, 2665, 2667, 2669, 2671, 2673, 2675, 2677, 2679, 2681, 2683, 2685, 2687, 2689, 2691, 2693, 2695, 2697, 2699, 2701, 2703, 2705, 2707, 2709, 2711, 2713, 2715, 2717, 2719, 2721, 2723, 2725, 2727, 2729, 2731, 2733, 2735, 2737, 2739, 2741, 2743, 2745, 2747, 2749, 2751, 2753, 2755, 2757, 2759, 2761, 2763, 2765, 2767, 2769, 2771, 2773, 2775, 2777, 2779, 2781, 2783, 2785, 2787, 2789, 2791, 2793, 2795, 2797, 2799, 2801, 2803, 2805, 2807, 2809, 2811, 2813, 2815, 2817, 2819, 2821, 2823, 2825, 2827, 2829, 2831, 2833, 2835, 2837, 2839, 2841, 2843, 2845, 2847, 2849, 2851, 2853, 2855, 2857, 2859, 2861, 2863, 2865, 2867, 2869, 2871, 2873, 2875, 2877, 2879, 2881, 2883, 2885, 2887, 2889, 2891, 2893, 2895, 2897, 2899, 2901, 2903, 2905, 2907, 2909, 2911, 2913, 2915, 2917, 2919, 2921, 2923, 2925, 2927, 2929, 2931, 2933, 2935, 2937, 2939, 2941, 2943, 2945, 2947, 2949, 2951, 2953, 2955, 2957, 2959, 2961, 2963, 2965, 2967, 2969, 2971, 2973, 2975, 2977, 2979, 2981, 2983, 2985, 2987, 2989, 2991, 2993, 2995, 2997, 2999, 3001, 3003, 3005, 3007, 3009, 3011, 3013, 3015, 3017, 3019, 3021, 3023, 3025, 3027, 3029, 3031, 3033, 3035, 3037, 3039, 3041, 3043, 3045, 3047, 3049, 3051, 3053, 3055, 3057, 3059, 3061, 3063, 3065, 3067, 3069, 3071, 3073, 3075, 3077, 3079, 3081, 3083, 3085, 3087, 3089, 3091, 3093, 3095, 3097, 3099, 3101, 3103, 3105, 3107, 3109, 3111, 3113, 3115, 3117, 3119, 3121, 3123, 3125, 3127, 3129, 3131, 3133, 3135, 3137, 3139, 3141, 3143, 3145, 3147, 3149, 3151, 3153, 3155, 3157, 3159, 3161, 3163, 3165, 3167, 3169, 3171, 3173, 3175, 3177, 3179, 3181, 3183, 3185, 3187, 3189, 3191, 3193, 3195, 3197, 3199, 3201, 3203, 3205, 3207, 3209, 3211, 3213, 3215, 3217, 3219, 3221, 3223, 3225, 3227, 3229, 3231, 3233, 3235, 3237, 3239, 3241, 3243, 3245, 3247, 3249, 3251, 3253, 3255, 3257, 3259, 3261, 3263, 3265, 3267, 3269, 3271, 3273, 3275, 3277, 3279, 3281, 3283, 3285, 3287, 3289, 3291, 3293, 3295, 3297, 3299, 3301, 3303, 3305, 3307, 3309, 3311, 3313, 3315, 3317, 3319, 3321, 3323, 3325, 3327, 3329, 3331, 3333, 3335, 3337, 3339, 3341, 3343, 3345, 3347, 3349, 3351, 3353, 3355, 3357, 3359, 3361, 3363, 3365, 3367, 3369, 3371, 3373, 3375, 3377, 3379, 3381, 3383, 3385, 3387, 3389, 3391, 3393, 3395, 3397, 3399, 3401, 3403, 3405, 3407, 3409, 3411, 3413, 3415, 3417, 3419, 3421, 3423, 3425, 3427, 3429, 3431, 3433, 3435, 3437, 3439, 3441, 3443, 3445, 3447, 3449, 3451, 3453, 3455, 3457, 3459, 3461, 3463, 3465, 3467, 3469, 3471, 3473, 3475, 3477, 3479, 3481, 3483, 3485, 3487, 3489, 3491, 3493, 3495, 3497, 3499, 3501, 3503, 3505, 3507, 3509, 3511, 3513, 3515, 3517, 3519, 3521, 3523, 3525, 3527, 3529, 3531, 3533, 3535, 3537, 3539, 3541, 3543, 3545, 3547, 3549, 3551, 3553, 3555, 3557, 3559, 3561, 3563, 3565, 3567, 3569, 3571, 3573, 3575, 3577, 3579, 3581, 3583, 3585, 3587, 3589, 3591, 3593, 3595, 3597, 3599, 3601, 3603, 3605, 3607, 3609, 3611, 3613, 3615, 3617, 3619, 3621, 3623, 3625, 3627, 3629, 3631, 3633, 3635, 3637, 3639, 3641, 3643, 3645, 3647, 3649, 3651, 3653, 3655, 3657, 3659, 3661, 3663, 3665, 3667, 3669, 3671, 3673, 3675, 3677, 3679, 3681, 3683, 3685, 3687, 3689, 3691, 3693, 3695, 3697, 3699, 3701, 3703, 3705, 3707, 3709, 3711, 3713, 3715, 3717, 3719, 3721, 3723, 3725, 3727, 3729, 3731, 3733, 3735, 3737, 3739, 3741, 3743, 3745, 3747, 3749, 3751, 3753, 3755, 3757, 3759, 3761, 3763, 3765, 3767, 3769, 3771, 3773, 3775, 3777, 3779, 3781, 3783, 3785, 3787, 3789, 3791, 3793, 3795, 3797, 3799, 3801, 3803, 3805, 3807, 3809, 3811, 3813, 3815, 3817, 3819, 3821, 3823, 3825, 3827, 3829, 3831, 3833, 3835, 3837, 3839, 3841, 3843, 3845, 3847, 3849, 3851, 3853, 3855, 3857, 3859, 3861, 3863, 3865, 3867, 3869, 3871, 3873, 3875, 3877, 3879, 3881, 3883, 3885, 3887, 3889, 3891, 3893, 3895, 3897, 3899, 3901, 3903, 3905, 3907, 3909, 3911, 3913, 3915, 3917, 3919, 3921, 3923, 3925, 3927, 3929, 3931, 3933, 3935, 3937, 3939, 3941, 3943, 3945, 3947, 3949, 3951, 3953, 3955, 3957, 3959, 3961, 3963, 3965, 3967, 3969, 3971, 3973, 3975, 3977, 3979, 3981, 3983, 3985, 3987, 3989,

The Economy of Air Cooling

By K. J. BOEDECKER

Field Service, Wright Aeronautical Corp.

The air-cooled engine of the radial type is far superior to the water-cooled engine in the ease with which either a complete or a top overhaul may be made. Take the case of a top overhaul of the Wright Whirlwind (J series), 8 cylinders, 300 hp. air-cooled engine—this would mean the grinding of

This can be done as follows: First remove thrust plate which is attached to crankcase front section by seven 1/2 in. bolts and nuts—then the thrust nut which is threaded in the crank shaft. After the nut 5/16 in. size holding it to the crankcase intermediate section have been removed, the crankcase front

plate can be made of a field where the engine was unknown to the

Simplicity of Overhaul

The simplicity of construction is further shown by the fact that the crankcase front section is removed and the crankshaft is removed in a piece. This was accomplished by taking off the front and intermediate crankcase sections in one piece and removing all the thrust nut and bolts. After the front and rear crankcase sections were removed, the crankcase front section was removed. With this work off and with the three cylinders removed, it was an easy matter to remove the thrust nut and two of the small connecting rods at these points, which gave ample room for the removal of the crankshaft. It was necessary, of course, to remove the gear at the end of crankshaft before the crankshaft could be removed. The removal of the crankshaft was accomplished by using a broken starter. Following the removal of the crankshaft, either the crankpin bearing or main bearing, or both, could be replaced. To replace the crankpin main bearing, removal of front and intermediate crankcase sections was necessary. To remove the front main bearing, only the thrust nut and front plate need be removed. For practically any of the foregoing replacement or repairs on a water-cooled engine, removal of engine from the plane and complete tear down would most certainly be necessary. The time and labor thus saved are big gains in favor of the air-cooled engine.

Great Saving in Man-Hours

In a well equipped shop which has all the facilities, including special tools, for the complete overhaul of both air-cooled and water-cooled engines, the time in man hours for overhaul of an air-cooled engine is from five-eighths to three-quarters of that required for the water-cooled engine. This time is based on a comparison of the engine hours for the overhaul of the 300 hp. air-cooled engine and the 300 hp. water-cooled engine of the Wright Whirlwind (J series) type. When both types of engines are built. If the labor of delivery is all important, less again the air-cooled engine is favored because more hands can be employed without interference with each other than in the case of the water-cooled engine. More repair hours are not so well equipped in a manufacturing plant and so the time difference is therefore greater—favoring the air-cooled engine, because fewer special tools and fixtures are required. Finally at different fields where both air-cooled and water-cooled engines are in use, inevitably brings forth the response that the mechanics would rather overhaul the air-cooled engine because of the simple construction and simplicity. Also, the necessity of replacing many of the wear parts and replacements are necessary, that valves require less time to be ground to a perfect seal and that bearing troubles are alleviated in the air-cooled engine. The absence of bearing problems is due to the close, rigid, simple design, balanced crankshaft in which shop is particularly discriminated and the three pinion main bearings with their aluminum friction and their capacity to stand considerable overloads. The crankshaft has its only bearing in the crankcase, so the engine is so simple that it is so simple that replacements are seldom necessary, except after hundreds of hours of operation.

How to Inspect Engine

For a general inspection of the crankshaft, crankshaft bearing and connecting rod bearings, the removal of the front and intermediate sections of crankcase in a unit is sufficient. After removal of all bearing caps, front and intermediate sections, made by separating the front section of the crankcase. Inspection of accuracy gaps may be made through the crankcase in crankcase rear section or the entire section removed after the main bearing is removed. The main bearing is removed and the accuracy driving gear on the crankshaft has been removed. Inspected in the rear section are the gas synchronizer shafts, oil pump—oil pump and two main gear synchronizer forming a single

unit—and sleeve, oil passage relief valve, tachometer drives and fuel pump, all of which are accessible and may be removed separately of desired whether the rear section is attached to the engine or not.

The accessibility of all parts of the air-cooled engine is, in fact, superior to that of the water-cooled engine that afford complete access necessary. However, accessibility plays an important part in the removal of superchargers and crankcase oil and therefore cannot be stressed too much. After a certain bearing it is frequently desirable to perform a further check, general inspection of the power plant whether or not there is any indication of trouble. Accessibility in the back inspection that the desired inspection will be performed, for accessibility leads to prevention, and delay in performing a necessary inspection may result in a considerable loss. The fact that the air-cooled engine may be left in the plane for a general inspection and that the time required for this inspection is less than would be required to remove an engine and install a new one of other type makes it one very desirable engine during and the maintenance of field schedules are important factors.

One Man Can Do Overhaul

When it is fully realized that all of the labor required to properly inspect and overhaul an air-cooled engine, either in the plane or on an overhaul stand, can be done by one man, it is not difficult to appreciate that the cost of overhaul will be very much less than that of a water-cooled engine. Again, if it is desired desirable to replace a complete engine, the time required is less for an air-cooled engine than for a water-cooled engine, which must, in most cases, have its radiator and attendant pipes and connections removed.

In summer or in the winter the fear of freezing and bursting of engine radiators and water pipes is eliminated. Thus, the labor of draining the water every time the ship is tied up for the night and the subsequent refilling in the morning is done away with. The air-cooled engine may be turned up to short crankshaft in one-half the time necessary for warming up a water-cooled engine, which again is a saving in time.

Runs on Commercial Gasoline

Commercial gasoline may be used if nothing better is obtainable and any good grade of kerosene oil. The fuel and oil consumption is comparable with that of water-cooled engines. A two-place elevator plane powered with the Wright Whirlwind 300 hp. air-cooled engine and carrying a 760 lb. payload has flown 665 mi. on a closed circuit at approximately 78 mi. per hr. in 5 hr. 55 min., using only 43.7 gal. of commercial gasoline. This is equivalent to 7.8 gal./hr. or 30.4 mi./gal.

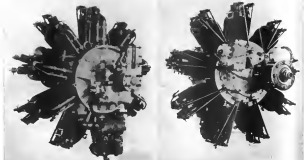
One of the main points in favor of the air-cooled engine—its weight affects altitude more than a water-cooled engine. The weight of the engine and its accessories is less than that of a water-cooled engine in pounds per horsepower. This light weight is reflected in the design of the plane which can be considerably lightened and thereby increase its pay load capacity or speed. The weight of the engine is also reflected in the comparison of few very similar planes built by the same plane manufacturer and powered—only with a Wright Whirlwind (J4) 300 hp. air-cooled engine and the other a Wright Trenchard (J4) water-cooled engine. The following table gives this comparison.

INFLUENCE OF ENGINE WEIGHT ON UTILITY LOAD AND PERFORMANCE.

Engine model	Weight	Altitude
Wright Whirlwind (J4) 300 hp.	1100 lb.	10,000 ft.
Wright Trenchard (J4) 300 hp.	1400 lb.	8,000 ft.
Wright Whirlwind (J4) 300 hp.	1100 lb.	10,000 ft.
Wright Trenchard (J4) 300 hp.	1400 lb.	8,000 ft.

Gear Representative

Frederic H. Goss & Machine Co., producers of aviation engine gears, recently completed arrangements for representation of ILL. Speed Reducers and Gear Products in Mexico by John A. Park, Orma Heri, Avenida Uruguay 15, Mexico City.



Rear and front views of the 300 hp. Wright Whirlwind (J series) radial air-cooled aviation engine

valves, removal of carbon, and possible removal of piston rings or pistons—if can be done by one man, one cylinder at a time, between flights if necessary, without disturbing the timing or any other part of the engine and without removing the engine from the plane. Removal of each cylinder can be accomplished in approximately one minute. On a water-cooled engine with individual cylinders the same housing must be removed as, with block construction, the blocks and cast removed and the engine re-timed. This means that a plane with an air-cooled engine can be kept in flight service continuously when needed and that the top overhaul may be done in short outlandings with no fear of tying up the plane for an extended period.

Even if it is necessary to make a complete overhaul of the Wright Whirlwind it can be done by one man without removing the engine from the plane. In fact, in eight hours one man removed, repaired and replaced the crank shaft of one of these engines while it was still mounted in the plane.

valves may be taken off, carrying with it the thrust bearing magnetism and magnetism driving gear. With the valve 5/16 in. size which means it is the crankcase main section. The crankcase may not be removed and then the crankcase intermediate section which carries with it the cam and its followers. The connecting rods are now exposed and may be removed. Next the head turning gear may be removed. With gear access to the crankshaft gear, the removal of which allows crankshaft to be drawn from the case. Next and last stage the crankcase may section, which is secured to its section by seven 5/16 in. bolts. The rear section section with it the oil pump, fuel pump, synchronizer shafts and tachometer drives. Now only the base crankcase remains in the plane. The above operations need not be followed in the sequence noted, but may be carried out in several different ways. An index of the simplicity and ease of tear down is demonstrated by the fact that a tear down almost identical to the

MONUMENTAL AIRCRAFT CO.

Office
1030 N. CALVERT ST.
BALTIMORE, MD.



Aerodrome
LOGAN FIELD
MARYLAND

WAREHOUSE: COLLEGE PARK, MD.

Announcement to all users of aircraft

We have just completed the purchase and assembly of the most complete line of JN and Canuck planes and parts; also OX-5, OX-6; we also have other motors and parts not listed, on which we offer exceptional prices. Ask us for what you want.

The large volume of our business enables us to offer these to the public at the most attractive prices. To demonstrate this see the following extracts from our catalog.

Radicals -	-	-	\$12.00	Propeller 1440 P.H.P.	-	-	\$2.200
Time (24hr) -	-	-	\$4.250	Zeus Carburetor -	-	-	\$12.00
Time, D.H. -	-	-	\$3.500	JN double screw pump -	-	-	\$45.00
Steel Aluminum (good low alloy) per foot -	-	-	\$12	Paints, Etc. -	-	-	\$15
Set of landing gear struts -	-	-	\$2.850	New Radicals engine -	-	-	\$15.00
Complete set of 80 parts -	-	-	\$1.000	Tandem propellers, of scales -	-	-	\$12.00
Exhaust, complete -	-	-	\$5.000	Have 120 H.P. propeller -	-	-	\$10.00
Aluminum -	-	-	\$5.000	Tank on landing gear -	-	-	\$12.00
Steel ship -	-	-	\$2.200	D.H. wheels -	-	-	\$4.00
Cylinder -	-	-	\$3.000	Complete set 20 tons -	-	-	\$1.25
Valves -	-	-	\$2.200				

"THE LEVIATHAN OF THE AIRCRAFT FIELD"

Aeroplane Motors

George 150 H.P. new complete motor 9 cylinder 252 pounds suitable aeroplanes, motor boats, car struts, wheel wagons, F.O.B. Dayton, O.

(Have extended the time limit of price advance to \$25.00 word May 19th)

Le Rhone 120 H.P. (type used for making radial engines) complete

Huyson 150 H.P. complete brand rated F.O.B. Minneapolis

Huyson 120 H.P. complete New brand New York or Minneapolis

Huyson 210 H.P. complete slightly used OK! Curtiss overhauled complete brand F.O.B. Minneapolis

WOULD YOU BUY A NEW OK! Curtiss at \$150.00 Advance

Recoil engine, with special passenger goggles clear glass 2.50

New and used aeroplanes \$600.00 up Curtiss, Standard, Avro, Thomas More

Parts propellers, wings, dye lens

Marvin A. Northrop

no Builders Exchange

Minneapolis, Minn.

WACO

Real performance in a three place ship with a stock OX-5 motor

Highest Speed
Highest Cruising Speed
Lowest Landing Speed
Best Speed Range
Quickest Take Off
Highest Angle of Climb
Lowest in Price

Steel Fuselage
Steel Empennage
Oleo Type Landing Gear
Thirty Seven Gallon Fuel Tank
Free Air Radiator

Do you want the booklet?

THE ADVANCE AIRCRAFT COMPANY
TROY, OHIO



FOR SEAPLANES

Many thousand gallons of Jolly's Vaseline Lubricant have been used by the U. S. Navy and War Department and all manufacturers of seaplanes.

L. W. Frohman & Co.
115 Eastland Street
Baltimore, Md., U. S. A.

Aircraft Gears

that are ACCURATE to 1/10,000 of an inch!

100% Ground tooth gear gives the greatest vibration-free, safe, dependable. The logical gear for airplane use.



Send for free booklet

FOOTE BROS. GEAR & MACHINE CO.

4949 N. CORTIS ST. CHICAGO, ILL.

Lamblin radiators

used all over the world on more than 10,000 aircraft

1524

1522

vertical radiator
horizontal radiator

ETABLISSEMENTS LAMBLIN 16, BOULEVARD HENRI DUNANT, NEUILLY-SUR-SEINE, FRANCE

DOPE

PIGMENTED
VARNISHES

DOPE
ENAMELS

TITANINE

MADE BY
TITANINE, Inc.
UNION, UNION COUNTY, N. J.

Consultants to U. S. Government

PLYWOOD

Water Resistant Panels

Made According to
Government Specifications
Any Size or Thickness

New Jersey Veneer Co.

Patterson, N. J., U.S.A.

SPEED WITH SAFETY



IN 1924 THE CURTISS EXHIBITION COMPANY

Flew over 100,000 Miles
Carried over 3,500 Passengers
Trained 52 Student Pilots

WITHOUT ACCIDENT

THIS RECORD WAS MADE POSSIBLE BECAUSE OF
Good Equipment, Competent Personnel, Careful Inspection

Among our satisfied clients are:

New York Times, New York Tribune, New York World, New York American, New York Evening Graphic, Boston Post, P. & A. Photos, International News Reel, United News Pictures, N. E. A. Service, Wide World Photos, Pathe News, Fox News, Famous Players, Fairchild Aerial Camera Corp., Underwood and Underwood, Hamilton Maxwell, Inc.

We are offering our 10 hour flying course
for 1925 at greatly reduced rates.

Write for Booklet

CURTISS EXHIBITION COMPANY
GARDEN CITY, N. Y., DRAWER B.